DOCUMENT RESUME

ED 281 143 CS 008 741

AUTHOR Ceprano, Maria A.
TITLE The Effects of Two Sight Word Teaching Methods on Featural Attention of Children Beginning to Read.
PUB DATE Apr 87
NOTE 31p.; Paper presented at the Annual Meeting of the American Educational Research Association (Washington, DC, April 20-24, 1987). Table 3 contains small print.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Beginning Reading; Behavior Patterns; *Context Clues; Decoding (Reading); Kindergarten; Learning Processes; Phoneme Grapheme Correspondence; Primary Education; Reading Comprehension; *Reading Instruction; Reading Research; Reading Strategies; *Sight Method; *Sight Vocabulary; Teaching Methods; Word Lists; *Word Recognition

ABSTRACT

Designed to add to the existing knowledge base concerning the saliency of features used by children to identify isolated words, a study examined whether the method of instruction influences the extent to which various features are used for word identification and recall. Subjects, 117 kindergarten students from a suburban Buffalo, New York, school were taught five words per day for eight days using either (1) a context approach, in which words were introduced with pictures in the context of written and spoken sentences; or (2) a features approach, in which the graphophonic characteristics of the words presented in isolation were emphasized. The substitution errors made by the two groups in three separate instances were analyzed and compared to determine the graphophonic cues most frequently used by children to recognize words. Analysis revealed no marked difference in the word perception strategies adopted by the two groups. In addition, both groups showed a similar increasing tendency to base word recognition responses on rotated whole word form as practice with new words diminished. Children taught by the context approach were found to be more attuned to the initial morphological components in the target list than were children taught by the features approach. The findings suggest that regardless of method, beginning readers do not attend to medial parts of words. In this regard, more focus on medial parts of words in a features style methodology may result in a higher rate of word learning. (Three pages of references are included.) (JD)

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The Effects of Two Sight Word Teaching Methods on Featural Attention of Children Beginning to Read

Maria A. Ceprano

St. Bonaventure University

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Running head: THE EFFECTS OF TWO SIGHT WORD TEACHING METHODS ON FEATURAL ATTENTION OF CHILDREN BEGINNING TO READ

Abstract

Two groups of beginning readers were taught five words per day for eight days by one of two standardized instructional approaches: (1) a Context approach in which words were introduced with pictures and in the context of written and spoken sentences or (2) a Features approach in which the graphophonic characteristics of the words presented in isolation were emphasized.

Substitution errors made by the two groups at three separate times during the 23 day span of the study were analyzed and compared to determine the graphophonic cues most frequently attended to for the purpose of recognizing words. Response analyses techniques applied to the data as a whole showed no marked difference in the word perception strategies adopted by the two groups. In this connection, it was noted that children in both groups showed a similar increasing tendancy to base word recognition responses on rotated whole word form as practice with new words diminished. A subtle indication of instructional influence was apparent in a subset of the data. Children taught by the Context Method were more attuned to the initial morphological components in the target list than were children taught by the Features Method. Findings are discussed in relation to their implication for design of sight word instructional methodology.

The Effect of Two Sight Word Teaching Methods on Featural Attention of Children Beginning to Read

The research reported in this paper stems from a larger project exploring various effects of two sight word teaching methods; one emphasizing the meaning of the word presented with context clues and the other emphasizing the graphophonic features of the word presented alone. In a previous paper the investigator (Ceprano, 1981) reported findings pertaining to the comparative efficiency of the two methods as observed on two separate modes of assessment: a sentence test (paralleling aspects of the Context Method) and an isolation test (paralleling aspects of the Word Alone Method.) A significant interaction between method of instruction and mode of assessment was noted, with the word alone group performing significantly better only on the isolation test. The two method groups performed similarly on the sentence test with the word alone group only slightly more adept at recognizing words on this measure. This finding suggested the biased nature of isolation tests and raised question about the findings of previous word learning experiments that used isolation tests alone to demonstrate superiority of word alone techniques over contextual ones.

In a later study (Ceprano,1985), the sentence test protocals of eleven high achievers from the Context Method group were selected and matched for number of recognized on the sentence test protocals of eleven high achievers from the Word Alone group. The oral reading miscues made by the subjects on that test were then analyzed to deliniate the differential influence of the two methods on children's use of graphophonic, syntactic and semantic constraints. Significant differences were observed only in the use of syntactic and semantic constraints with the Context Method group excelling on both dimensions.

The research reported in this paper has a two fold purpose. One is to add to the existing knowledge base pertaining to the saliency of features used by children to identify isolated words. Another is to determine if method of instruction influences the extent to which these various features are utilized for word identification and recall. The results of this research will be discussed in relation to previously discussed findings (Ceprano, 1981; 1985) and their implication for the design of sight word instructional techniques.

Background

A large number of studies have been conducted over the past fifty years to determine the graphic cues children use to differentiate words as they are taught to read. The larger portion of these studies have been of the laboratory variety featuring methodologies with high internal validity but bearing limited resemblance to what happens under natural learning conditions (Buswell, 1922; Gates and Boeker, 1923; Gibson, Pick and Osser, 1962; Hill, 1936; Marchbanks and Levin, 1965; Muehl, 1961; Rayner and Hagelberg, 1975; Timko, 1970; Williams, Blumberg and Williams, 1970.) However, some studies have utilized naturalistic settings and procedures to shed light on children's initial word perception strategies (Barr, 1975; Davidson, 1931; Hildreth, 1935; Meek, 1925; Weber, 1970; Wiley, 1928; Wilson and Flemming,1938.) Regardless of its nature, the research has on the one hand, unquestionably established that the initial and final letters in words are the most salient. On the other hand, only limited and somewhat divided findings have been offered on the saliency of length. Early studies by Wiley (1928) Hildreth (1935) found length to have no bearing on word learning. Gates and Boeker (1923) on the other hand found short words were learned more quickly than long words when length was kept constant; and lists of words varied in length were learned more easily than lists of words controlled for length. In a reanalysis of Wiley's data, Barr (1975) found children used approximate length to make decisions

related to word identification and recall.

The findings relative to the saliency and influence of word shape have also been divided with laboratory studies almost always discrediting the value of this feature; but the only two naturalistic studies addressing the question suggesting it has some positive influence (Davidson, 1931; Barr, 1975).

Interestingly with regard to the studies available on feature utilization, the conceptualization of word perception as a process which involves simultaneous sampling of various features within words is observable and accounted for in the research design of only the most recent studies (Barr, 1975; Rayner and Hagelberg, 1975 and Weber,1970). Weber did not account systematically for the utility of shape, but Barr and Rayner and Hagelberg offered evidence that beginning readers utilize shape to some degree for word identification.

Of late a few researchers have probed the effects that instructional methods have on children's evolving reading strategies (Barr, 1972; 1975; DeLawter, 1970; Elder, 1972.) The results of their studies suggest that phonic and sight methods of reading instruction impact the reading process differentially with phonic methods promoting a tendency to work out words one by one by sounding them out serially, and sight methods promoting a reliance on word form, pictures and context to guess at words. Of the many studies reviewed above, none addressed questions regarding the influence that

instructional directives have on word perception and featural attention during the initial word learning process. Moreover none have explored possible featural usage once instruction and practice has been terminated. Because of the implications answers may have for design of instructional techniques and our understanding of the word learning process, the present study undertakes these questions.

Method

Subjects

Subjects were 159 kindergarteners from seven classes in a suburban Buffalo school. Selection of subjects was based on their (a) inability to read at least 35 of 40 words targeted for experimental instruction and (b) ability to retain at least two words on the visual component of the Word Learning Task (WLT) (Kibby, 1975). Five graduate students trained in giving WLT assisted in selection procedures carried out three days prior to initiation of the experiment. Within classes, subjects who recognized no words from the target list were randomly assigned to the Context Method group or the Features Method group. Subjects who recognized between one and four target words were rank ordered and assigned in turn to one condition or the other. The study spanned 23 days in the last two months of the school year. Since subjects were required to attend all instructional and assessment sessions, the sample at the culmination of the experiment was reduced to 61 children in the Context Method group (34 males and 27 females) and 56 children in the

Features Method group (29 males and 27 females.)

Materials

Target Word List. The 40 words selected from four preprimers of the Holt Basic Reading System included different types of function words (i.e. I, a). The words were grouped into eight sets of five, each set to be taught on a designated day of the study. Each set contained words varying in length and shape. Only three words from each set were concrete words that could be represented with a picture.

Instructional Materials. The materials for each method allowed for the standardized presentation of words by seven experimental teachers. For the Context Method, each concrete word was introduced with three cues: a picture/word cue, a written cue and a spoken cue. The picture/word cue was a 5"x8" card containing a line drawing with the corresponding word printed below it. For the 12 words that could not be illustrated, the card contained the word printed alone.

The spoken cue was one or two sentences said by the teacher which would define or show how the word was used in the language. Spoken cues were typed on the back of each picture/word cue card and could be read by the teacher as the card was displayed.

The written cue was a 5"x16" oaktag card containing a two to six word sentence composed of words previously taught and the new word underlined in red. (Three words found in the sentences were not on the target list but were introduced

to subjects during the WLT administration.) The Context Method also required one set of 5"x8" cards containing a target word printed in isolation.

The Features Method necessitated three sets of 5"x8" cards each showing target words in isolation. A felt tip pen was provided to accentuate each word's distinctive features.

On each of the eight days when words were introduced (days one through four and six through nine) teachers were given a package containing materials for implementing both methods. A 24"x36" pocket chart was provided so the teachers could display all cue cards described above according to standardized guidelines for each method.

Materials for Data Collection. Materials used to measure instructional phase effects (See Segment 3 below), delayed retention effects and long term retention effects (See page 12 below.) consisted of a set of 2"x4" cards on which words were printed in isolation. Record sheets for noting data for each of the time effects contained areas on which subjects' substitution errors (of interest in this study) as well as correct responses (used in previous reports) could be recorded.

Experimental Teachers

Eleven graduate students were trained as experimental teachers and data collectors. Of the eleven, seven served as regular teachers for the study. The additional four were placed on a substitute list and were on call in the event one of the regular teachers could not be present. Barring

two absences of this nature, the same teachers taught the same four groups during the instructional sessions; two groups by the Context Method and two by the Features Method. All eleven trainees were involved in the data collection tasks. All trainees who participated as teachers and/or data collectors were paid $10.00 a day for their services.

Procedures

Five words a day were taught on days one through four and six through nine of the study. To facilitate instruction, the 79 subjects within each method group were assigned to smaller groups of four to six children. On each day, each small group was taken to a quiet area and given word instruction by the assigned method. For control purposes, the order in which the four small groups were seen for instruction by each teacher was counterbalanced through the eight days of instruction.

Description of Teaching Methods

The procedures for each method included three segments which took place each day:

Segment 1. Context Method children were given the oral cue cue as the picture/word cue was placed on the pocket chart. They were then asked to look at each new word and picture identifying it (when the picture was available.)
After the identity of each new word was revealed, the children were told to look at the sentence cue as it was placed beside the picture/word cue on the pocket chart. The instructor then read the sentence to the children pointing to

the new word within it.

Features Method children heard each word and were told to look at it as the corresponding word card was placed on the pocket chart. Once the five words were displayed, selected children pointed out the longest and shortest words in the list. The teacher then directed the group to look at the beginning and ending letters of each word as well as specific letter patterns within words (See Appendix A). As she did so, the teacher said the sounds of the letters or patterns in isolation and then quickly within the words being taught (i.e."ay" - "play" and "b" - "bear"). Finally, as the teacher said the word, she outlined its shape with a felt tip pen, the teacher focussed the group's attention to its ascending and descending letters.

For each method, words were presented in the same order.

Segment 2. Context Method children took turns putting a word card on top of its match (the underlined word in the sentence) on the pocket chart. With the aid of the teacher, the group then read the sentence aloud. The teacher then read the five words randomly. As the words were called, individual children removed the corresponding word cards from the chart.

Features Method children also took turns putting a word on top of its match in isolation on the pocket chart. The list of words was then read in unison by the group. Finally the teacher read the five words in mixed order. As each word was read, a selected child removed the corresponding card

from the chart.

Segment 3. Children from both groups were seen individually by their teacher and asked to read the five words that had been taught as well as words taught up to previous sessions. The words were shown in mixed up order and children's responses were noted. Substitution errors, of interest in this study, were recorded exactly as said by the child. The accumulation of responses made from day one through nine provided the data reflecting instructional phase effects.

Additional Activities

On day five and after instruction on day nine both the Context and Features Method groups received directed reading lessons of short stories composed soley of words taught to date. Basically the children were told to read each page silently to answer a question asked by the teacher. After this, an oral reading of the story was done in unison by the group. This provided a read along review of words taught to date.

Administration of Retention Measures

Two measures of word recognition and featural attention were administered: The first, on day ten of the study (Delayed Retention Effects) and the second on days 22 and 23 of the study (Long Term Retention Effects). Two days were required for the latter due to end of year school functions. No confounding effects were suspected however,

since children in both groups were tested on both days. For each test, each child was shown the 40 words in random order. Responses were recorded as correct or incorrect. Incorrect responses of the substitution type were recorded exactly as said by the child.

Analysis of the Data

Deliniation of features used by subjects was accomplished by comparing each word presented for recognition (i.e.top) with the substitution error it elicited (i.e.tip) to establish points of identity. It was assumed that the features shared by target word and response error were the ones which are most salient and therefore most used for recognizing words. Comparisons were made on 24 categories each describing a specific feature on which of set of words might be similar. These categories are decribed in Table 1.

Insert Table 1 about here.

It will be noted that the categories are a composite of of those used by several previous investigators. For example, Gibson (1963) suggested error classification allowing for children's tendancy to rotate letter or shape features (See categories 10, 11 and 14); and Weber (1970) used categories describing specific letter patterns shared by target and error (See all A and B categories). In addition,

substitutions made by children were classified according to whether they were from the target list previously introduced.

A grand total of 4,272 substitutions (2,282 by the Features group and 1,990 from the Context group) were generated. Given this body of errors and the rather large number of features on which each set of words was analyzed and categorized, manual classification and coding was not feasible. Consequently a computer program (Laurence and Ceprano, 1979) was developed for that purpose. The program, in essence placed a score of 1 in any feature category for which a set of words matched, a score of 0 where no match was accomplished and a blank where no match was possible. Because raw scores for substitution errors classified in each category were not comparable among subjects, they were converted to proportions. Features used less than 10% of the time were considered so infrequently utilized as to offer little reliable information for evaluating effects of treatment over time. Consequently, no further statistical analyses were applied to these data. Features used with a relative frequency of at least 10% of the cases were submitted to a 2(method) by 3(time of test) multivariate analysis of variance (MANOVA) so that differences in feature utilization by each method group might be ascertained.

Findings and Discussion

Table 2 shows the relative frequency with which selected features were shared by substitution errors and exposed

words.

Insert Table 2 about here.

Most striking in Table 2 is that 79% of the substitutions made by the total group over the course of the investigation were words introduced during the study's instructional phase. This inclination of beginning readers to use the composition of the target list as a response cue has been previously reported by Barr (1972) who concluded that tendancy is indicative of a guess strategy on the learner's part. The constraints which such a tendancy is apt to impose on the relative use of letter, length and shape features must be kept in mind as other findings are reported.

With respect to the graphophonic features, Table 2 reveals the high utility of the first and last letter cues. More than 41% of the substitutions shared the same first letter with the exposed word. At the same time, nearly 24% of the substitutions contained the same last letter as the expected response. Also important was length, utilized as a cue with a relative frequency of 21%. Overall shape, when considered in the same orientation as the target word appears to be the least attended cue, noted by the total group with a relative frequency of 6.3%. Several investigators have suggested, however that form is independent of spatial position. This reality is observed in categories 10, 11 and 14. Category 10 pertains to substitutions which suggest the

first letter of the exposed word was inaccurately perceived as a cue due to the reversibility or transposibility of its shape (i.e. when for mother and up for no). Over 22% of the substitutions being of this nature suggests that beginning readers utilized the shape of letters at the beginning part of the word as a cue for recognition. Confusions due to shape of final letters stemming from reversability or transposability (i.e. and for up) were most infrequent (See category 11). Only 1.75% of the errors displayed such a tendancy. Category 14 refers to cases where the two words were of the same geometric shape but the shape of one was a reversal or transposition of the other (i.e dog for get; make for open). Approximately 9% of the miscues displayed this feature. Collapsing category 13 (Shape the same) and category 14 (Shape the same in rotated form) suggests the possibility of total word configuration acting as a cue in as much as 15% of the cases. Thus word shape or shape at the beginning of the word does seem to play a role in children's decision on word recognition and recall.

The validity of the psycholinguistic perspective discussed by Smith (1971), that word recogniton ensues from the sampling of a number of cues (letters, length and shape) simultaneously is substantiated when the proportion of substitution errors falling into any "A" category is compared with the proportion of errors falling into its complementing "B" category. The higher proportions displayed for any "A"

category clearly demonstrates the process of recognizing words requires the use of more than one cue simultaneously.

It will be noted that over 90% of the substitutions falling into category 4A are accounted for in category 4B. This high degree of commonality is unique to the four letter category and will be discussed in the section below. The saliency of distinctive letters has been reported by several investigators including Gates and Boeker, (1923), Davidson, (1931), and Hildreth,(1935). With respect to category 12, errors classified therein suggested an oddly shaped letter or letter cluster may have acted as a cue in at least 15% of the applicable cases.

Cue Selection as a Function of Treatment and Time

Treatment and time effects on feature utilization were explored only with respect to categories holding 10% or more of the substitution errors. An exception with regard to the 10% criterion was made for error types reflecting the use of shape (categories 13 and 14) as the investigator wished to assess if this dimension discriminated between treatments or if the saliency of this feature changed with experience.

Insert Table 3 about here

Table 3 shows the source of variation for each feature category retained for analysis. Results show the only significant source of variation with respect to any of the

letter features tested appeared in categories 4A and 4B (First Four Letters the Same). Herein, variation attributable to time of testing and interaction of method with time were not significant. Only the effect of method was significant at the .01 level for category 4A and at the .05 level for category 4B. Table 4 shows the mean proportion of errors based on the first four letters as defined by categories 4A and 4B at each time of testing.

Insert Table 4 about here

Mean proportion of responses made on the basis of the first four letters was highest for the Context Method group at each time of testing. These results may be explained by the fact that substitution errors placed in categories 4A and 4B pertained to words of at least five letters in length. There were only 10 words on the target list on which such substitutions could be made: (Goldilocks, someone, good-by, cookbook, cookies, mother, where, people, little and trick). An examination of these words reveals that at least half of them contain a four letter morpheme in the initial position. The findings of the MANOVA applied to categories 4A and 4B suggest the Context Method group was significantly more aware of the initial roots and whole meaningful components of longer words than was the Features Method group.

Shape in rotated form (category 14) was also found to be

a discriminating variable, with the only significant effect stemming from time of testing $F(1, 86) = 6.69$, $p < .01$).

Insert Table 5 about here

Table 5 shows the mean proportion of errors placed in category 14 at each time of testing.

Considering both groups together, the tendancy to rotate shape increased 3.45% between the instructional phase and the first posttest session when Delayed Retention Effects were assessed, Univariate $F(1,87) = 8.36$, $p<.01$. A mean increase of .65% between the first posttest session and the second posttest session (Long Term Retention Effects) for this type of error was not significant. These results suggest that the reliability and effectiveness of word configuration diminishes as practice with the word is eliminated.

Summary and Conclusions

In the initial part of this paper, the investigator reported the effects of the Context and Features Method on word learning efficiency as observed on both an isolation and sentence measure. It was noted that the Features Method seemingly produced quantitatively higher performance on both measures but that the significantly higher rate of word learning observed only on the isolation measure had to be questioned as it stemmed from a test whose nature was biased for method. In spite of this, the Features Method exhibited

at least a tendancy for accelerated word learning on both tests. Consequently, the present study was done to reveal some basic explanation for the finding. Specifically the study was done to reveal the effects of method on children's awareness of graphic and phonic word features independent of syntactic and semantic constraints. The results of the experiment showed the profiles of the two method groups were not remarkably different. With little exception, both groups perceived the visual characteristics of words similarly and in the same way as has been described by previous investigators of cue saliency. Considering the results pertaining to word learning (Ceprano,1981) the Features group's tendancy to excel is inferred to stem from instructional directives which focussed their attention on word parts worth remembering and which at the same time imparted knowledge on the use of those parts to descriminate and decipher new words from ones previously taught. Given a situation where context cannot be utilized, children who are not taught how to use graphophonic features to discriminate and decipher words resort to whole word memory. This limited strategy may have greater chance of producing confusion of the new word with ones previously taught.

The findings suggest that regardless of method, medial components of words are not attended to by beginners. In this regard, more focussing to medial parts of words in a features style methodology may result in a higher rate of word learning.

The results of this study show that beginning sight word

learners rely on shape to some degree but that memory for this feature seems to be ephemeral over time. This suggests the importance of distributed practice with words once they are introduced since children otherwise have an increasing tendancy to base word recognition responses on rotated word form.

All this is not to say that context clues should be deemphasized with beginners. Ceprano (1985) showed that the Context Method benefited beginners us of syntactic and semantic constraints and the results of other investigators (Delawter, 1970; Elder,1971) have promoted the long range benefits of doing so. Indeed, in teaching sight words, directives which balance attention to distinctive word features with attention to language and meaning constraints may be most rewarding. A procedure which seems most sensible is to introduce new words in isolation giving attention to various word parts including shape and its spatial orientation and immediately follow up by providing practical experience in reading the word in a familiar contextual environment such as a simple sentence dictated by the child or the teacher.

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Table 1

Substitution Error Response Classifications

Target word and substitution error responses were compared on the following features:

General Classification	Category Number	Specific Feature (on which error and target were compared)	Descriptive Example (Target → Error)
I. Letter or Letter Cluster in Specified Position	1A	First Letter (OLA)[a]	where-when; the-trick
	1B	First Letter (OLD)[b]	the-trick
	2A	First Two Letters (OLA)	where-when; where-who
	2B	First Two Letters (OLD)	where-who
	3A	First Three Letters (OLA)	cookies-cool; cookies-cookbook
	3B	First Three Letters (OLD)	cookies-cool
	4A	First Four Letters (OLA)	cookies-cookbook; cookies-cooking
	4B	First Four Letters (OLD)	cookies-cookbook
	5A	Last Letter (OLA)	here-home; dog-big
	5B	Last Letter (OLD)	dog-big
	6A	Last Two Letters (OLA)	home-come; home-came
	6B	Last Two Letters (OLD)	home-came
	7A	Last Three Letters (OLA)	cookbook-cook; make-cake
	7B	Last Three Letters (OLD)	cookbook-took
	8A	Last Four Letters (OLA)	cookbook-book; mother-brother
	8B	Last Four Letters (OLD)	cookbook-book
	9A	First & Last Letters (OLA)	home-house; home-here
	9B	First & Last Letters (OLD)	home-here
	10	First Letter in Rotated Form (OLA)	bear-down; good-by-book
	11	Last Letter in Rotated Form (OLA)	read-big; it-of
	12	Distinctive Letter(s) (The letters j, k, w, y, x, z, oo) (OLA)	like-Goldilocks
II. Shape	13	Shape	boy - big ; down - here
	14	Shape in Rotated Form	big - pit ; read - bear
III. Length	15	General Length[c]	make-makes; and-an; Ben-and
IV. Other	16	Previously Taught Word[d]	book-Goldilocks

[a](OLA) indicates other letters in the target word and error could be anything.

[b](OLD) indicates other letters in the target word and error are different.

[c]Substitution is of the same length; one letter longer or one letter shorter than the target.

[d]The common feature is the source of response or the target list.

Table 2

Relative Frequency of Occurrence of Various Features Selected for Study as Observed in the Analysis of Substitution Errors

General Classification	Category Number	Specific Feature (on which error and target were matched)	Relative Frequency of Occurrence (percentage)
I. Letter or Letter Cluster	1A	First Letter (OLA)[a]	41.09
	1B	First Letter (OLD)[b]	15.44
	2A	First Two Letters (OLA)	13.89
	2B	First Two Letters (OLD)	4.91
	3A	First Three Letters (OLA)	6.20
	3B	First Three Letters (OLD)	.66
	4A	First Four Letters (OLA)	11.84
	4B	First Four Letters (OLD)	10.63
	5A	Last Letter (OLA)	23.55
	5B	Last Letter (OLD)	8.82
	6A	Last Two Letters (OLA)	2.96
	6B	Last Two Letters (OLD)	1.96
	7A	Last Three Letters (OLA)	1.10
	7B	Last Three Letters (OLD)	.67
	8A	Last Four Letters (OLA)	.71
	8B	Last Four Letters (OLD)	.00
	9A	First & Last Letters (OLA)	7.91
	9B	First & Last Letters (OLD)	4.43
	10	First Letter in Rotated Form (OLA)	23.33
	11	Last Letter in Rotated Form (OLA)	1.75
	12	Distinctive Letter(s) (The letters j, k, y, w, x, z, oo) (OLA)	15.36
II. Shape[c]	13	Shape	6.28
	14	Shape in Rotated Form	8.69
III. Length	15	General Length[d]	21.60
IV. Other	16	Previously Taught Word	79.07

[a](OLA) indicates other letters in the target word and error could be anything.

[b](OLD) indicates other letters in the target word and error were different.

[c]Because of the researcher's interest, shape categories were retained for further analysis in spite of coming short of the 10% criterion.

[d]Substitution error is of the same length, one letter longer or one letter shorter than the target.

Table 3

Analysis of Variance Summary Table for Effects of Treatment and Time on Feature Cue Selection

Category	No.	Source of Variation	df[a]	F
First Letter (OLA)[b]	1A	Method		.09
		Time of Test		1.07
		Method x Time of Test		.07
First Letter (OLD)[c]	1B	Method		.49
		Time of Test		1.34
		Method x Time of Test		.37
First Two Letters (OLA)	2A	Method		.64
		Time of Test		.10
		Method x Time of Test		.17
First Four Letters (OLA)	4A	Method		6.02**
		Time of Test		.45
		Method x Time of Test		.16
First Four Letters (OLD)	4B	Method		4.01*
		Time of Test		.18
		Method x Time of Test		.23
Last Letter (OLA)	5A	Method		.54
		Time of Test		.78
		Method x Time of Test		.32
First Letter In Rotated Form (OLA)[b]	10	Method		2.53
		Time of Test		.78
		Method x Time of Test		.32
Distinctive Letter (OLA)	12	Method		.46
		Time of Test		2.41
		Method x Time of Test		.62
Shape	13	Method		1.17
		Time of Test		.86
		Method x Time of Test		1.00
Shape In Rotated Form	14	Method		.20
		Time of Test		6.69**
		Method x Time of Test		.10
General Length	15	Method		.47
		Time of Test		.44
		Method x Time of Test		.30
Previously Taught Word	16	Method		.67
		Time of Test		1.60
		Method x Time of Test		2.47

[a]For each 2 (method) x 3 (time of test) MANOVA, the df = z for between groups; 83 for within groups and 88 in total.

[b](OLA) indicates other letters in the target word and error could be anything.

[c](OLD) indicates other letters in the target word could be different.

*$p < .05$.

**$p < .01$.

Table 4

Mean Proportion of Response Errors Based on First Four Letter Cues as a Function of Treatment and Time

Category	Treatment	Time of Effects		
		Instructional Phase	Delayed Retention	Long Term Retention
First Four Letters (OLA)[a]	F	9.04	9.68	6.12
	C	14.65	16.90	14.37
Pooled Within Group SD		12.02	23.49	18.69
First Four Letters (OLD)[b]	F	9.92	9.68	6.12
	C	12.93	13.36	13.78
Pooled Within Group SD		10.99	21.22	18.60

[a](OLA) indicates other letters in the target word and error could be anything.

[b](OLA) indicates other letters in the target word were different.

Table 5

Mean Proportions and Standard Deviations of Shape in

Rotated Form Errors as a Function of Treatment and Time

Treatment	Time Effects		
	Instructional Phase	Delayed Retention	Long Term Retention
F	6.73	10.08	10.14
C	5.62	9.17	10.45
Pooled Within Group SD	7.33	12.29	13.35

The Target Word List

Following is the list of words taught during the experiment's instructional phase. The words are listed in the order in which they were presented on the specified day of the study.

Day 1	1.	Ben[1]	Day 6	1.	cookies
	2.	Goldilocks		2.	go*
	3.	girl		3.	make
	4.	the*[2]		4.	pig
	5.	We*		5.	said*
Day 2	1.	read	Day 7	1.	it*
	2.	book		2.	she*
	3.	like		3.	people
	4.	is*		4.	home
	5.	someone		5.	trick
Day 3	1.	play	Day 8	1.	cookbook
	2.	Where*		2.	are*
	3.	mother		3.	come*
	4.	to*		4.	into
	5.	dog		5.	down
Day 4	1.	little	Day 9	1.	good-by
	2.	bear		2.	Who*
	3.	big		3.	up
	4.	in		4.	open
	5.	and*		5.	here*

[1]Underlined letters are patterns suggested for emphasis as part of the DF presentation method. Letter patterns were not underlined on word cards.

[2]The C method required that words be illustrated with a picture whenever possible. Asterisks indicate words which were not easily amenable to such cueing and therefore presented without pictures.